

Developing and Using Background Concentrations at Sediment Remediation Sites Proposed Workshop

Problem Statement:

Many sediment remediation sites are located in waterbodies where specific site-related contaminants of concern are also released from other sources in the waterway. This most frequently occurs in urban settings but may also occur in certain rural or agricultural areas. Other sources may include releases from industrial and municipal outfalls such as POTWs, CSOs and storm water discharges; run-off from contaminated soil, roadways, rooftops and other impervious surfaces; as well as from air deposition. Contaminant concentrations that are not attributable to the specific remediation project site releases are known as “background.”

According to Superfund policy, site cleanup levels are not generally set at concentrations less than natural or anthropogenic background (USEPA, 2002). Although background information is important to the risk manager, developing background concentrations in settings with multiple sources and complex hydrology has proven to be a challenge for practitioners. Furthermore, approaches for developing and using background concentrations to support remediation projects have not been consistent. Therefore, we propose that expert practitioners gather to discuss challenges and share methods for developing and using appropriate background concentrations at sediment remediation sites.

Objectives of the Workshop:

- Discuss and gain common understanding about current agency policy and guidance regarding the definition and use of background concentrations in relation to Superfund and sediment remediation sites, including those located in urban estuaries.
- Share and discuss approaches and challenges associated with developing and using background concentrations
- Identify tools and approaches for developing technically sound background concentrations and identify ways to address specific challenges
- Based on consensus, develop principles to guide the development and appropriate use of background concentrations at sediment remediation sites
- Begin to develop case studies that illustrate methods and approaches for the development and appropriate use of background concentrations (would likely require some follow-up)
- Begin to outline a technically sound approach (practitioner guidance) for the development and appropriate use of background concentrations (would require follow-up)

Preliminary Questions and Challenges:

Questions about the definition and use of background concentrations

Primary questions for consideration:

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1. What is the difference between natural and anthropogenic background?
2. Are “reference sites” for background calculations different than “reference sites” for ecological risk assessments? How should data from such sites be pooled to perform statistical calculations?
3. If an upstream source control is planned, how is the uncertainty regarding effectiveness and timing incorporated into current and projected background concentrations?

Questions about approaches and challenges associated with developing and using background concentrations

Primary Questions for Consideration:

1. What sediment depth should be considered when collecting background samples and what considerations need to be addressed in determining this depth (e.g., biologically active zone, resuspension)?
2. What media are important to consider in determining and using background concentrations?
3. What are the guidelines for identifying the appropriate area boundary for determining background?
4. When is it important to consider atmospheric deposition while determining background concentrations?
5. How are “outliers” defined when calculating background? What statistical methods are available for managing outliers?
6. How are non-detects addressed in the background calculations?
7. What approach should be used to ensure populations are consistently chosen to calculate statistical values (e.g., UTL 95/95)?
8. What is the role of non-statistical methods (e.g., geochemical evaluation of metals) in determining what samples are contaminated with metals and which have high concentrations due to anthropogenic or natural background at a site?

Secondary questions for consideration:

1. How is the density of sampling determined when collecting background samples?
2. Should COCs such as PAHs, PCBs and dioxin/furans be OC-normalized when calculating background? When is it appropriate to OC-normalize and when is it not?
3. How should background sampling programs in tidal areas be designed?
4. Is it beneficial (beyond cost) and appropriate to composite samples from areas exhibiting similar sediment characteristics (grain size, density, organic carbon content), or does compositing only reduce statistical power and the ability to quantify uncertainty when determining background?
5. Should anticipated improvements to CSOs/other source control measures be incorporated into current background calculations at all?
6. If no upstream source control measures are currently planned and funded, should no further reductions be assumed?
7. Should detection limits be set at or as close as possible to risk-based protective concentrations for key COCs even though background concentrations are much higher (DQOs)?

8. Should the number and type of sediment samples for background(?) be the same as that to be specified in the post-remediation monitoring plans?
9. Should a SWAC, based on random sampling be the metric used for pre- and post- sediment conditions?
10. If most exposures are a result of the contaminant concentrations in the surface layer (i.e., top 2 – 15 cm), should any mixing and dilution into clean cap surfaces be considered?
11. Do we need a new term to describe the post-remediation sediment concentration that includes recontamination; i.e., distinguish the use of the term background in risk assessment vs its use in developing cleanup levels?
12. Is it appropriate to think about background for Year 0 or for Year 30?

Definition of Terms (initial):

- Background - refers to constituents or locations that are not influenced by the releases from a site, and is usually described as naturally occurring or anthropogenic (EPA, 1989; EPA, 1995a):
- Natural Background - *Naturally occurring* substances present in the environment in forms that have not been influenced by human activity (EPA, 1989; EPA, 1995a)
- Anthropogenic Background - natural and human-made substances present in the environment as a result of human activities (not specifically related to the CERCLA site release or project site release in question) (EPA, 1989; EPA, 1995a):
- Reference Site(s)

Existing Technical Guidance: (initial list)

US Department of the Navy (DON). 2003. "GUIDANCE FOR ENVIRONMENTAL BACKGROUND ANALYSIS Volume II: Sediment." Naval Facilities Engineering Command. NFESC User's Guide UG-2054-ENV

U.S. Environmental Protection Agency (USEPA). 1989. "*Risk Assessment Guidance for Superfund (RAGS): Volume I: Human Health Evaluation Manual (HHEM), (Part A), Interim Final.*" EPA/540/1-89/002, OSWER 9285.70-02B. USEPA, Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency (USEPA). 1999. "*A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents.*" OSWER 9200.1-23p. USEPA, Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency (USEPA). 2002. "*Role of Background in the CERCLA Cleanup Program*". OSWER 9285.6-07P. USEPA, Office of Solid Waste and Emergency Response.